

Claims

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

- 5 1. An apparatus for removing hydrogen sulfide gas from a stream of hydrogen sulfide laden natural gas, comprising:
 - (a) a column,
 - (b) at least one inlet pipe disposed near the base of said column for receiving hydrogen sulfide laden natural gas and releasing said hydrogen sulfide laden natural gas within said column,
 - 10 (c) a scavenging agent including a group IIA metal hydroxide covering said at least one inlet pipe,
 - (d) an outlet pipe disposed at the upper end of said column above the level of said scavenging agent for receiving natural gas after said natural has passed through said scavenging agent,
 - 15 whereby said group IIA metal hydroxide reacts with said hydrogen sulfide of said hydrogen sulfide laden natural gas to form a group IIA metal sulfide and whereby said natural gas leaving said column has a lower concentration of hydrogen sulfide gas than said hydrogen sulfide laden natural gas entering said column.

- 20 2. The apparatus of claim 1 wherein:

 said group IIA metal hydroxide is calcium hydroxide.

3. The apparatus of claim 1 wherein:

said scavenging agent is a slurry including water and a group IIA metal hydroxide.

5 4. The apparatus of claim 1 wherein:

said scavenging agent is a slurry including water and calcium hydroxide.

5. The apparatus of claim 1 wherein:

said scavenging agent is a granular form of a group IIA metal hydroxide.

10 6. The apparatus of claim 1 wherein:

said scavenging agent is a granular form of calcium hydroxide.

7. The apparatus of claim 1 further comprising:

15 (a) a source of fresh scavenging agent in communication with said column for supplying fresh scavenging agent to said column, and
(b) a collection tank in communication with said column for receiving used scavenging agent from said column.

20 8. The apparatus of claim 1 further comprising:

(a) a fresh scavenging agent source in communication with said column for adding fresh scavenging agent to said column,

(b) a used scavenging agent collection vessel in communication with said column for receiving used scavenging agent from said column, and,

(c) a means for regulating the rate of addition of fresh scavenging agent from said fresh scavenging agent source and the rate of removal of used scavenging agent such that the concentration of unreacted group IIA metal hydroxide remains 5 within a desired range.

9. The apparatus of claim 1 further comprising:

(a) a fresh scavenging agent source in communication with said column for adding fresh scavenging agent to said column,

(b) a used scavenging agent collection vessel in communication with said column for receiving used scavenging agent from said column,

(c) a hydrogen sulfide detector for detecting the presence of hydrogen sulfide in natural gas leaving said column,

(d) a control system operatively associated with said hydrogen sulfide detector for causing the addition of fresh scavenging agent to said column and the corresponding removal of used scavenging agent from said column when said hydrogen sulfide detector detects a concentration of hydrogen sulfide above a predetermined level.

10. An apparatus for removing hydrogen sulfide gas from a stream of natural gas, comprising:

(a) a column,

- (b) an at least one sparge pipe disposed near the lower end of said column for receiving hydrogen sulfide laden natural gas and distributing said hydrogen sulfide natural gas at the base of said column,
- (c) a slurry of water and particulate calcium hydroxide submerging said at least one sparge pipe,
- (d) an outlet pipe disposed toward the upper end of said column above the level of said slurry for receiving natural gas after said natural gas passes through said slurry, whereby said calcium hydroxide reacts with said hydrogen sulfide of said hydrogen sulfide laden natural gas such that said natural gas leaving said column has a lower concentration of hydrogen sulfide than the hydrogen sulfide laden gas entering said column.

10 11. The apparatus of claim 10 further comprising:

- 15 (a) a fresh slurry source in communication with said column for injecting fresh slurry to said column,
- (b) a used slurry collection vessel in communication with said column for receiving used slurry from said column, and,
- (c) a means for regulating the rate of injection of fresh slurry from said fresh slurry source and the rate of outlet of used slurry such that the concentration of unreacted calcium hydroxide remains within a desired range.

12. The apparatus of claim 10 further comprising:

- (a) a fresh slurry source in communication with said column for injecting fresh slurry to said column,
- (b) a used slurry collection vessel in communication with said column for receiving used slurry from said column,
- (c) a hydrogen sulfide detector for detecting the presence of hydrogen sulfide in natural gas leaving said column,
- (d) a control device linked to said hydrogen sulfide detector for initiating the injection of fresh slurry from said fresh slurry source and for initiating a corresponding outlet of used slurry such that the concentration of unreacted calcium hydroxide in the slurry in said column is increased when the concentration of hydrogen sulfide in the natural gas leaving said column rises above a predetermined level and such that the injection of fresh slurry and the removal of used slurry ceases when the concentration of hydrogen sulfide in the natural gas leaving said column falls below a predetermined level.

13. A method for removing hydrogen sulfide gas from a stream of natural gas, comprising the following steps:

- (a) providing a column having an inlet at the base of said column and an outlet at the upper end of said column,
- (b) charging said column with a scavenging agent including a group IIA metal hydroxide,
- (b) introducing hydrogen sulfide laden natural gas into said inlet,

(c) receiving natural gas from said outlet having a lower concentration of hydrogen sulfide than the natural gas entering said inlet.

14. The method of claim 13, wherein:

5 said group IIA metal hydroxide is calcium hydroxide.

15. The method of claim 13, further comprising the steps of:

(a) sampling the natural gas leaving said column to determine the concentration of hydrogen sulfide,

10 (b) removing used scavenging agent from said column and replacing said used scavenging agent with fresh scavenging agent if the concentration of hydrogen of sulfide gas in said natural gas leaving said column is above a predetermined level and continuing such replacement of used scavenging agent with fresh scavenging agent until the concentration of hydrogen sulfide in said natural gas leaving said 15 column falls below a predetermined level.

16. The method of claim 13, further comprising the steps of:

(a) providing a fresh scavenging agent supply source in communication with said column via a first controllable conduit,

20 (b) providing a used scavenging agent collection vessel in communication with said column via a second controllable conduit,

 (c) providing a hydrogen sulfide detector for sensing the concentration of hydrogen sulfide in the natural gas leaving said column,

(d) providing a control device in communication with said hydrogen sulfide detector,

(e) operatively associating said control device with said first and second controllable conduits such that fresh scavenging agent is added to said column and used scavenging agent is removed from said column when said hydrogen sulfide detector detects a concentration of hydrogen sulfide above a predetermined level and such that the addition of fresh scavenging agent and the removal of used scavenging agent ceases when said hydrogen sulfide detector detects a concentration of hydrogen sulfide below a predetermined level.